

# Management of the GB System Overnight



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Electricity Operational Forum – October 2012

# Agenda

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- Focus on 13<sup>th</sup>/14<sup>th</sup> September
- Changes from D-5 to D-1
  - Wind Forecast
  - Changes on the Transmission System
  - Strategy to manage
- Margin Analysis
  - Finding the economic balance
- Real-Time data

## D-5

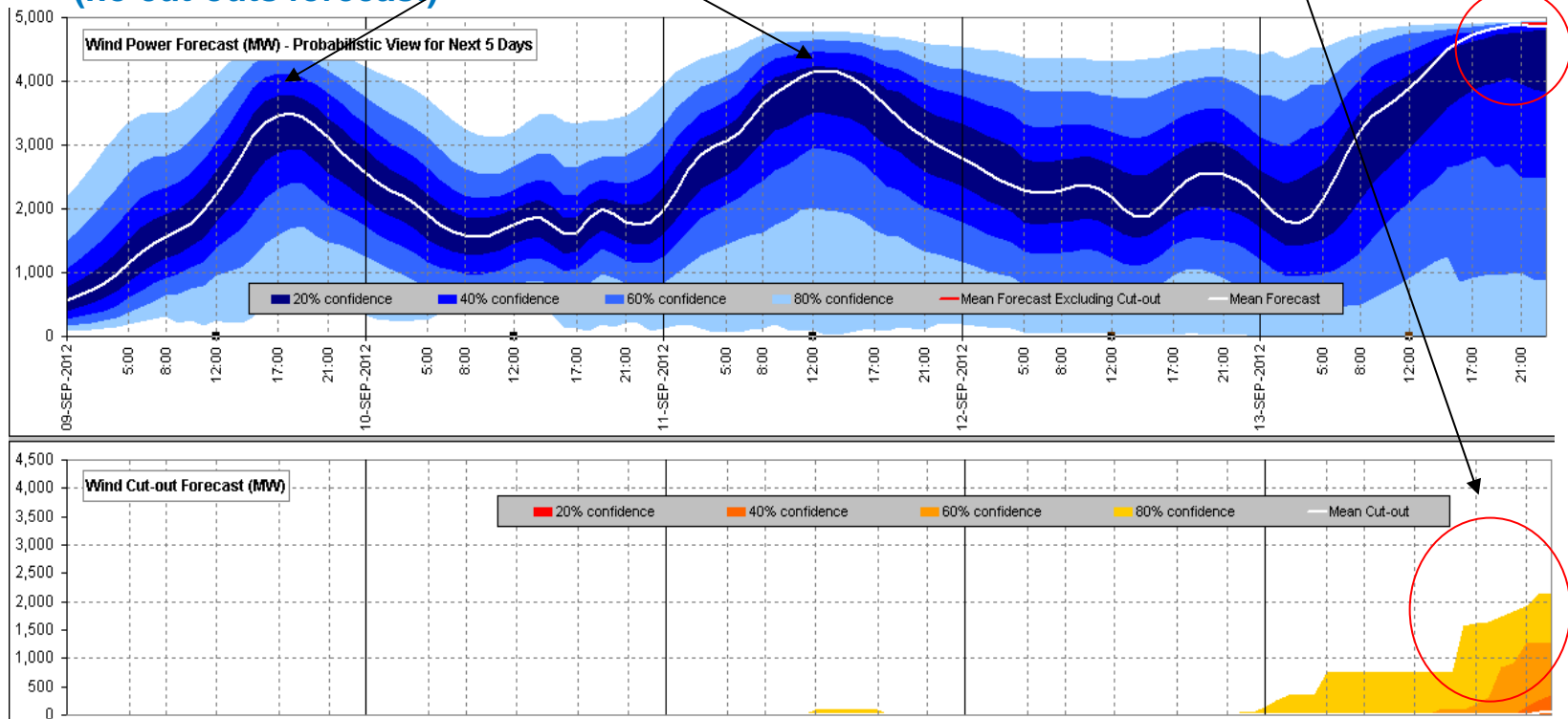


# Wind Forecast (D-5)

## ■ First Indication from 5 day ahead wind forecast

High wind but occurs across daytime  
When system demands are high  
and hence manageable  
(no cut-outs forecast)

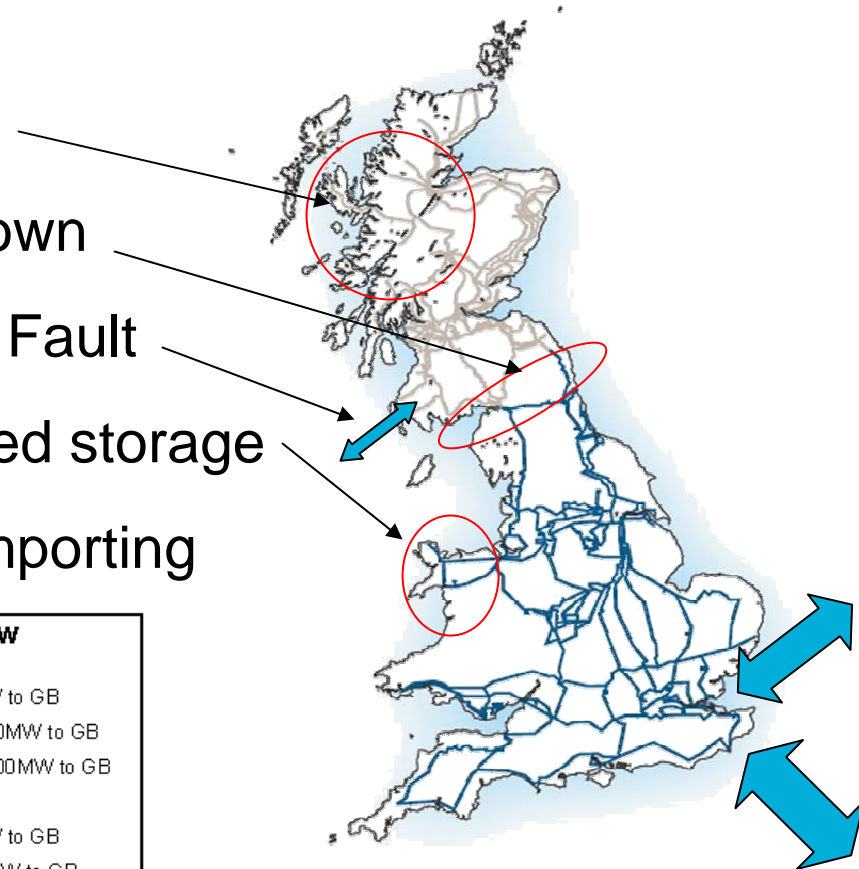
Potential peak wind overnight  
(potentially (very high levels of cut-out))



# Forecast System Conditions (D-5)

## ■ Active Constraints

- Local Scottish constraints
- Scottish Export Capability down
- Moyle Interconnector Bipole Fault
- Fault Outage restricts pumped storage
- Interconnectors to Europe importing overnight



Week Ahead Flow		
<b>BritNed</b>	23:00 - 05:00	1000MW to GB
	05:00 - 09:00	200 - 500MW to GB
	09:00 - 23:00	600 - 1000MW to GB
<b>IFA</b>	23:00 - 05:00	1500MW to GB
	05:00 - 09:00	0 - 500MW to GB
	09:00 - 23:00	600 - 1200MW to GB

### Comment

Week ahead spreads between UK and the continent continue to be volatile but have widened this morning, due to a drop in prices on the continent.

## Planning & Strategic decisions

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- A “heads up” at this stage
- Information shared to all planning and strategy teams in order to review plans for incoming week
- No firm actions/decisions taken

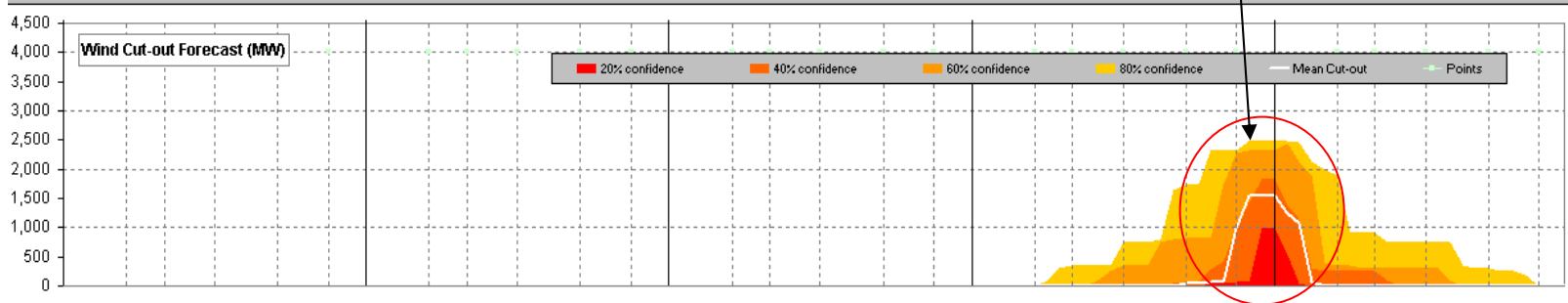
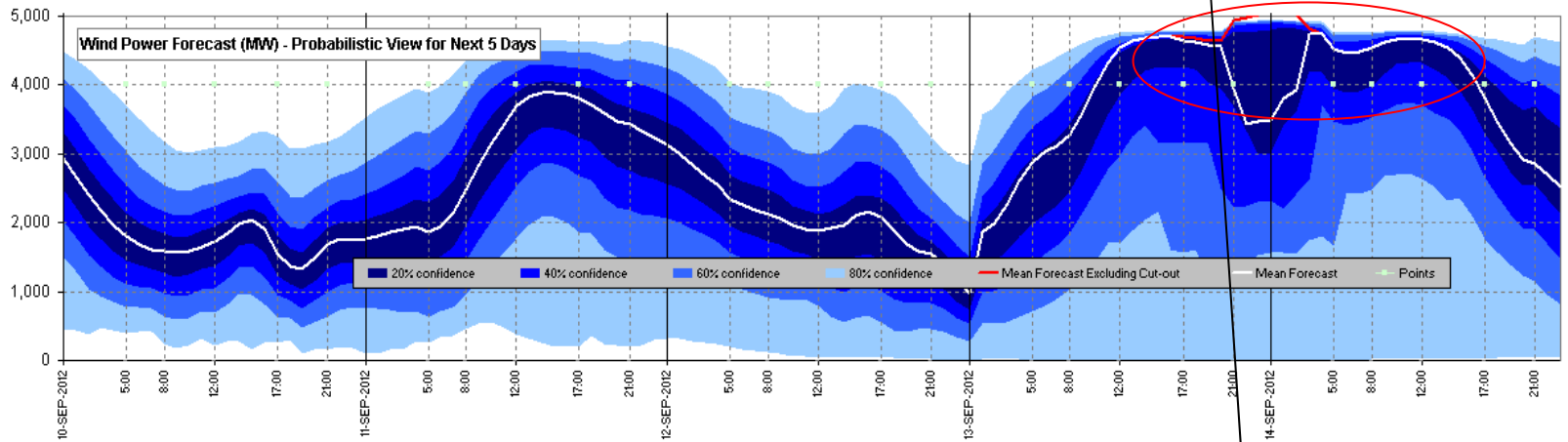
## D-4



# Wind Forecast (D-4)

## ■ Potentially record wind levels

Potential peak wind overnight  
(potentially record cut-out)





# System Changes (D-4)

- Generation Changes
  - New breakdowns (2.8GW)
  - New returns (1.8GW)
- Transmission Changes
  - New Outages Commencing
    - Eight 400kV / 275KV ccts
    - Fourteen busbar outages
  - Outages Returning
    - One 400kV cct
    - Two busbar outages
  - New Fault Outages
    - None

## Daily Generation Report

### Plant returned

* CDCL-1	395
* FERR-3	500
* STAY-1	440
* WBUPS-1	500
<b>Total</b>	<b><u>1,835</u></b>

### Breakdowns & Zero MELs - New

* BAGE-1	490
* BARK-1	395
* BARK-B2	595
* FELL-1	120
* STAY-2	440
* SUTB-1	785
<b>Sub-total</b>	<b>2,825</b>

### BritNed

Interconnector Forecast	
23:00-05:00	0-500 MW to GB
05:00-08:00	1000 MW to NL
08:00-19:00	0-500 MW to GB
19:00-23:00	Float
<b>IFA</b>	
23:00-05:00	1500 MW to GB
05:00-07:00	500 MW to FR
07:00-23:00	500 MW to GB

### IFA

## Planning & Strategic decisions (D-4)

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- List of key outages to return in order improve export capability from Scotland
  - Confirm Moyle Interconnector will still be restricted in capability
- Prepare to initiate contracts
  - Increase demand in Scotland
  - Contract to manage North Wales pumping restrictions
- Additional resource requirements for
  - Control Room in order to manage high wind curtailment
  - Standby Traders to trade in advance where economic

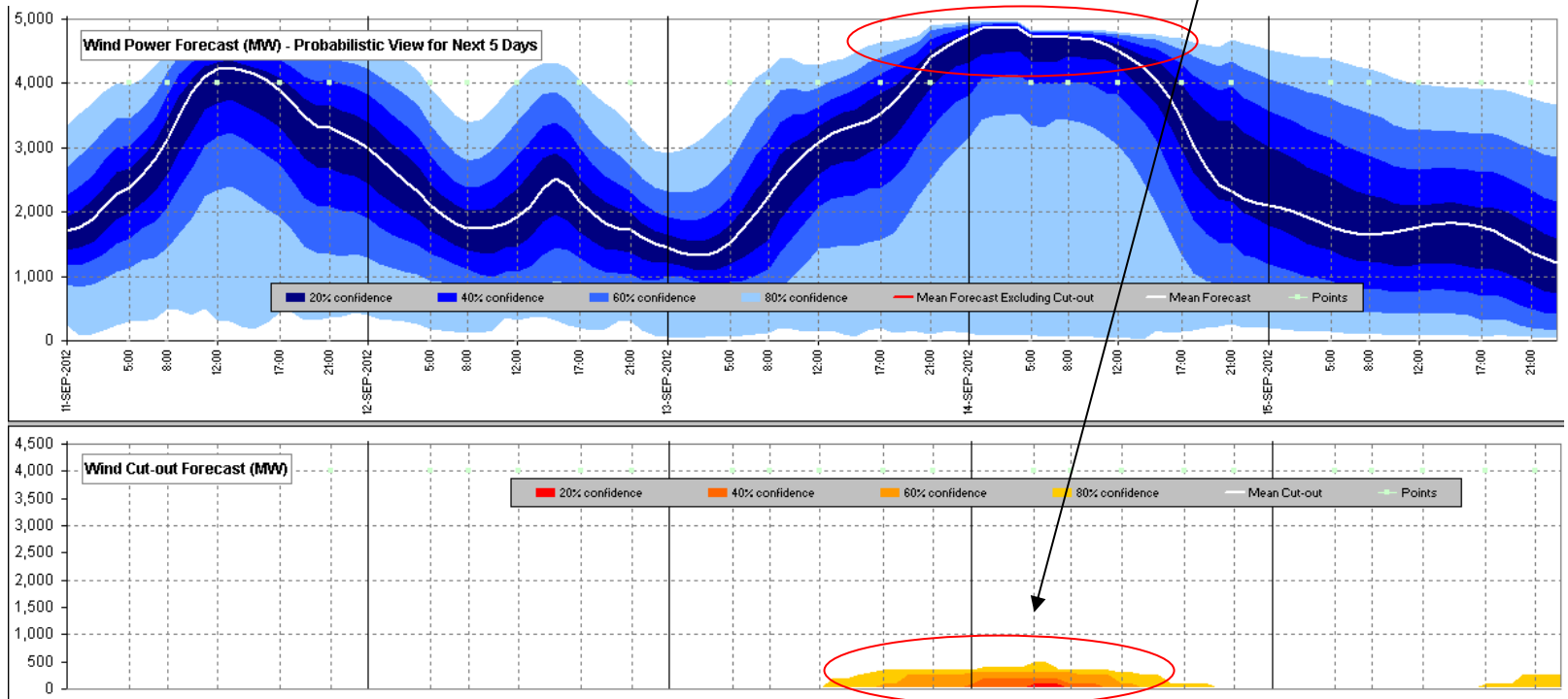
## D-3



# Wind Forecast (D-3)

## ■ Diminishing risk of cut-out issues

Potential peak wind overnight  
(Probability of high levels of cut-out reducing)



# System Changes (D-3)

- Generation Changes
  - New breakdowns (2.5GW)
  - New returns (1.6GW)
- Transmission Changes
  - New Outages Commencing
    - Two 400/275kV ccts
    - Three busbars
  - Outages Returning
    - One busbar
  - New Fault Outages
    - None

## Daily Generation Report

Plant returned		
*	BARK-1	395
*	BARKB2	595
*	SCCL-3	400
*	STAY-2	440
	<b>Total</b>	<b><u>1,830</u></b>

## Breakdowns & Zero MELs - New

*	COSO-1	770
*	DIDC-1	485
*	DRAXX-3	645
*	EGGPS-3	495
*	USKM-14	120
	<b>Sub-total</b>	<b>2,515</b>

## BritNed

## IFA

Interconnector Forecast		
23:00-05:00	1000 MW to GB	
05:00-08:00	0-500 MW to NL	
08:00-23:00	500 MW to GB	
23:00-05:00	1000 MW to GB	
05:00-07:00	1000 MW to FR	
07:00-23:00	1000 MW to GB	

## Planning & Strategic decisions (D-3)

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- Unable to recall key Scottish Transmission cct which will increase Scottish Export capability
  - 8 hour return (ERTS) not able to be delivered
  - Significant setback in economically managing high wind in Scotland across this overnight period
- Unable to fix fault outage in time which is restricting North Wales pump storage capability
- High wind event to be managed by Trading in advance (where economic) and significant redispatch in the Balancing Mechanism
  - May potentially require system warnings (NRAPM)

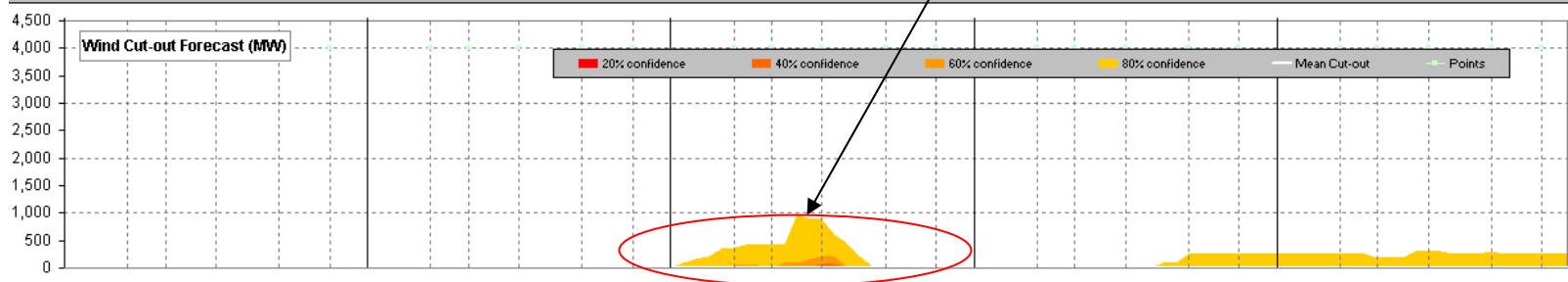
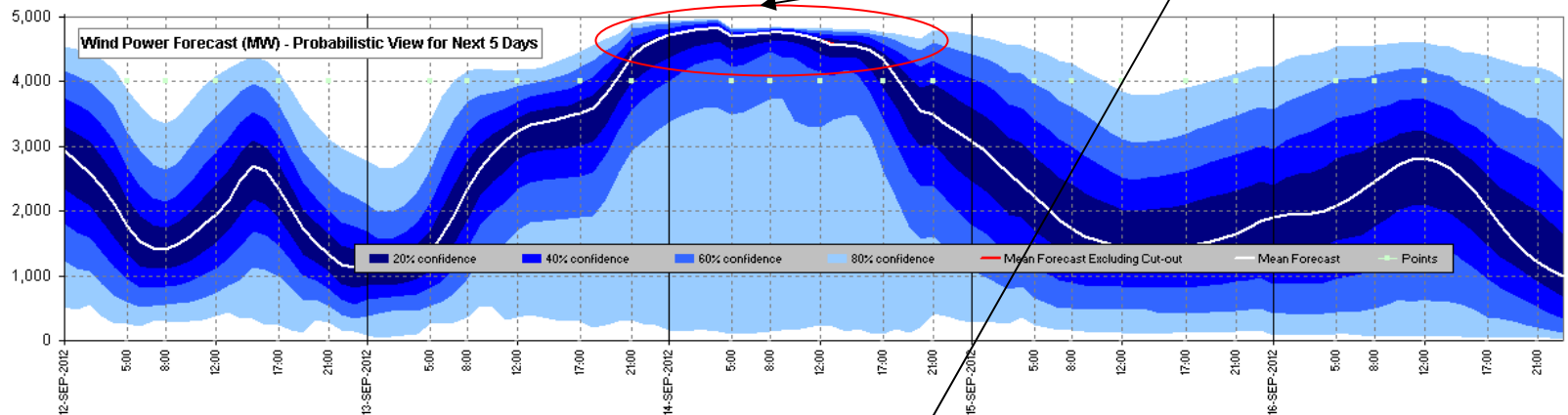
## D-2



# Wind Forecast (D-2)

## Forecast Confidence high

Potential peak wind overnight – higher confidence  
(Probability of high levels of cut-out increasing from previous forecast)





# System Changes (D-2)

- Generation Changes
  - New breakdowns (1.7GW)
  - New returns (2.9GW)
- Transmission Changes
  - New Outages Commencing
    - Three busbars
  - Outages Returning
    - Four 400/275kV ccts
    - Four busbars
  - New Fault Outages
    - None

## Daily Generation Report

Plant returned		
*	BAGE-1	490
*	COSO-1	770
*	DIDC-1	485
*	DRAXX-3	645
*	EGGPS-3	495
<b>Total</b>		<b>2,885</b>

## Breakdowns & Zero MELs - New

*	DIDC-4	485
*	EGGPS-1	495
*	EECL-1	400
*	TILB-10	275
<b>Sub-total</b>		<b>1,655</b>

## BritNed

## IFA

Interconnector Forecast		
BritNed	23:00-05:00	1000 MW to GB
	05:00-08:00	0-500 MW to NL
	08:00-23:00	500 MW to GB
IFA	23:00-05:00	500-1000 MW to GB
	05:00-07:00	1000 MW to FR
	07:00-23:00	1000 MW to GB

## Planning & Strategic decisions (D-2)

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- Review wind farms that can provide response / post fault / constraint management actions
  - 2 wind farms available – 16MW of High Response
  - Plan to hold post fault drops (>600MW) on large key wind farms
  - Will use a mixture of trading wind farms off and managing in the BM (subject to economic assessment)
- Standby Traders to trade with 3<sup>rd</sup> parties to manage interconnector flows
- May cancel planned internal Control Room software upgrade

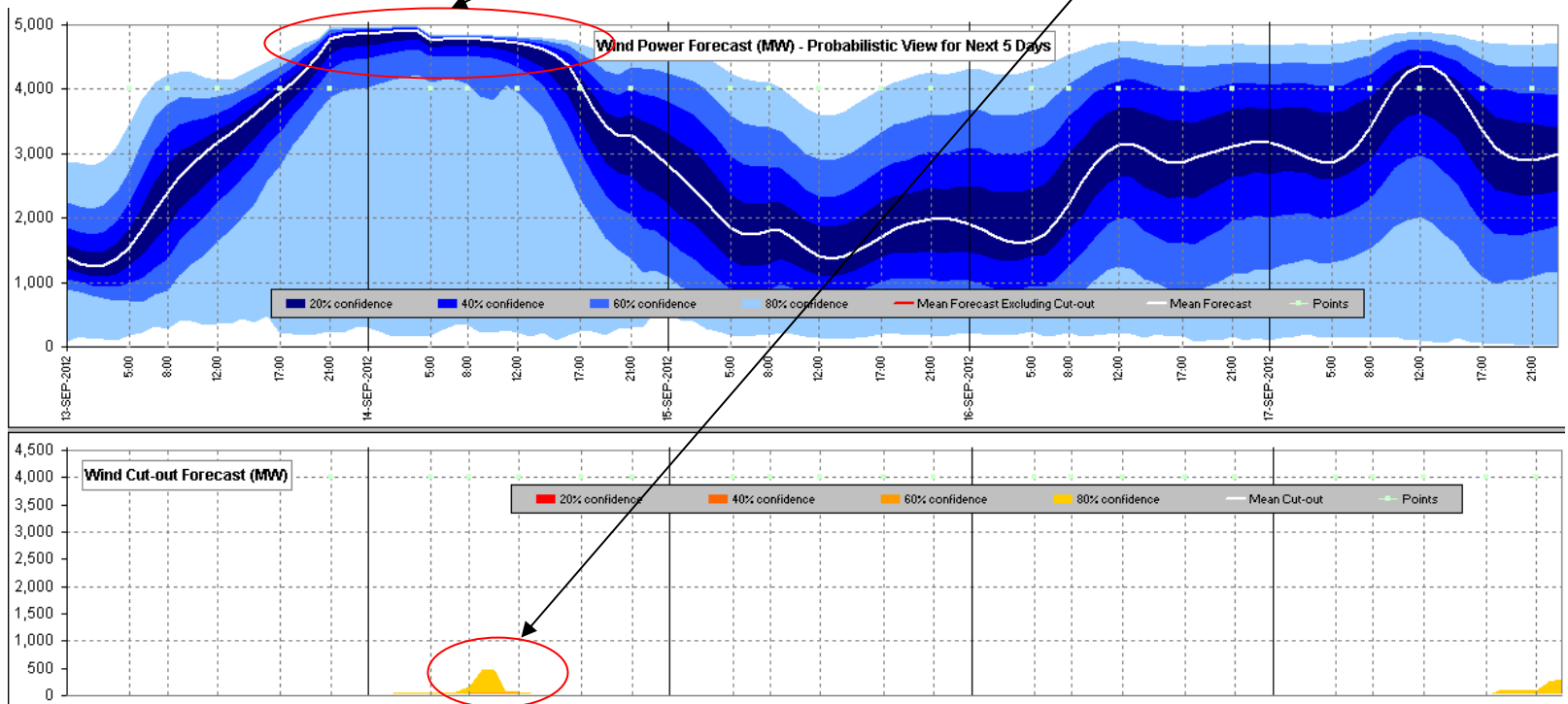
# D-1



# Wind Forecast (D-24 hours)

## ■ High Forecast Confidence

Potential peak wind overnight – high confidence  
(High levels of cut-out unlikely)



# System Changes (D-1)

- Generation Changes
  - New breakdowns (1.3GW)
  - New returns (0.3GW)
- Transmission Changes
  - New Outages Commencing
    - Four 400kV/275kV ccts
    - Four busbars
  - Outages Returning
    - Four 400/275kV ccts
    - Four busbars
  - New Fault Outages
    - None

## Daily Generation Report

<b>Plant returned</b>		
*	TILB-10	275
*	USKM-14	120
	<b>Total</b>	<b>395</b>

## Breakdowns & Zero MELs - New

*	ALCN-1	450
*	KINO-3	500
*	SCCL-3	400
	<b>Sub-total</b>	<b>1,350</b>

**BritNed**

**IFA**

## Interconnector Forecast

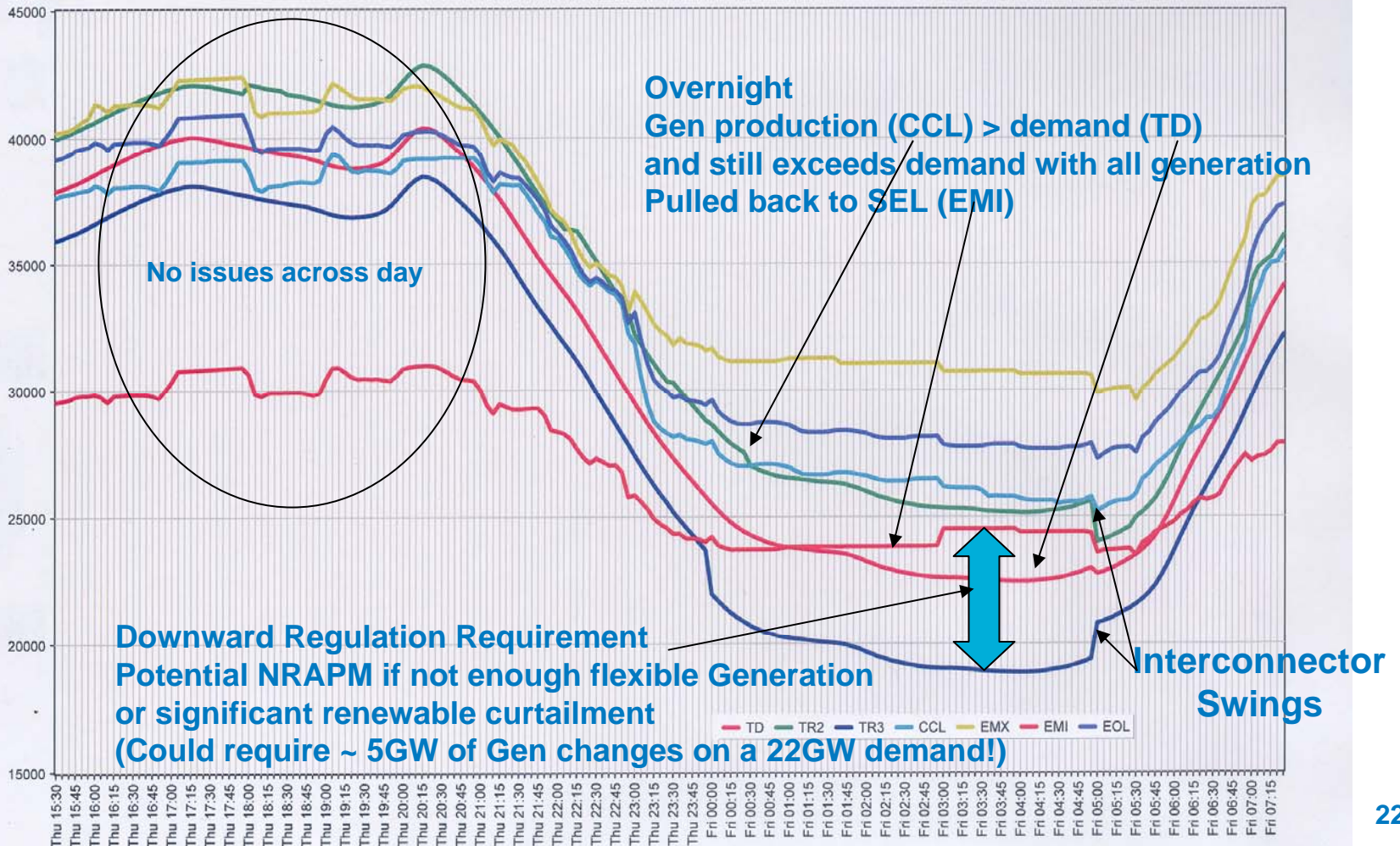
23:00-05:00	500 to GB
05:00-08:00	Float
08:00-23:00	700 MW to GB

23:00-05:00	1200 MW to GB
05:00-07:00	Float
07:00-23:00	1300 MW to GB

# Margin Analysis (D-18 hours)

As at Prelims 1B SOP

Margins Analysis Graph: Printed on 13/09/12 11:29 Scrolled View: Data from Thu 13 1530 to Fri 14 0725



## Margin Analysis (D-18 hours)

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- Market Summary at 18 hours out from 1B min demand
  - Excess generation above demand i.e. system will be long and not balanced
    - 6 large “flexible” coal stations have high SEL i.e. “inflexible”
  - Interconnectors are forecast to be on max import across the GB minimum demand period due to European energy prices vs. GB energy prices
    - TSO to TSO liquidity likely to be low to reverse
  - GB System Operator will require significant redespach actions to manage
- Market still active and hence not a fixed position

## Planning & Strategic decisions

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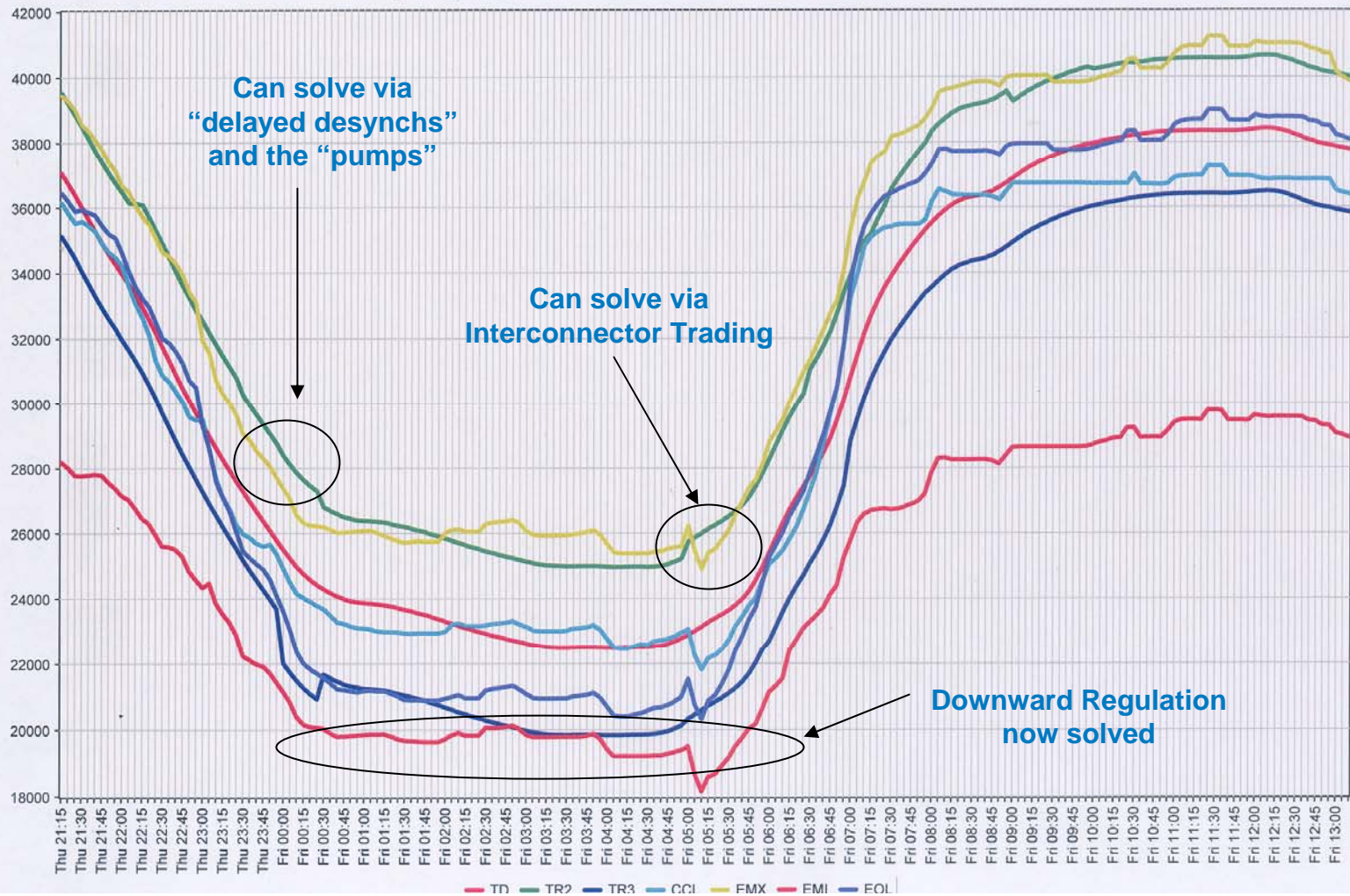
- Run Southern CCGT for voltage support overnight
  - Locational requirement for south of country
- Trade off plant in advance if economic (~1.2GW)
  - Mixture of coal and renewable generation
- Plan to “2-shift” 6 coal BMUs (~3GW of capacity) in the BM (or trade in advance)
- Plan to trade on interconnectors post interconnector gate closure (~0.5GW)
- Planned BM software update cancelled



# Margin Analysis (D-6 hours)

Start of N shift

Margins Analysis Graph: Printed on 13/09/12 21:19 Scrolled View: Data from Thu 13 2115 to Fri 14 1310

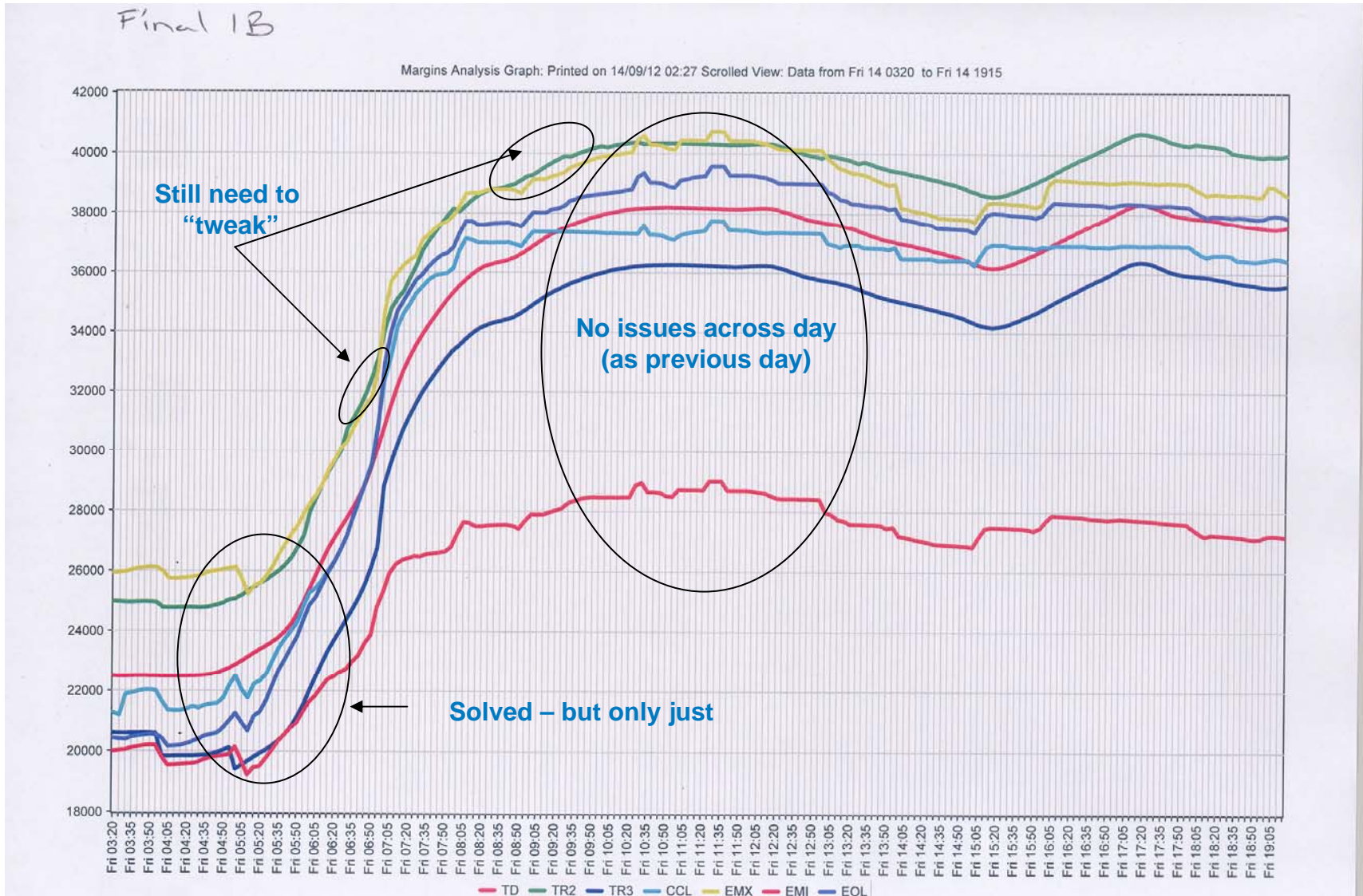


# Planning & Strategic decisions

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- Downward now solved
  - Market still active and hence this position can change until gate closure
- Still have upward margin issues but can solve via
  - Extending Generation or changing pumping
  - Interconnector Trading
- Economic decision to trade in advance on Interconnectors
  - 0.5GW (05:00 to 06:00)

# Margin Analysis (D-3 hours)



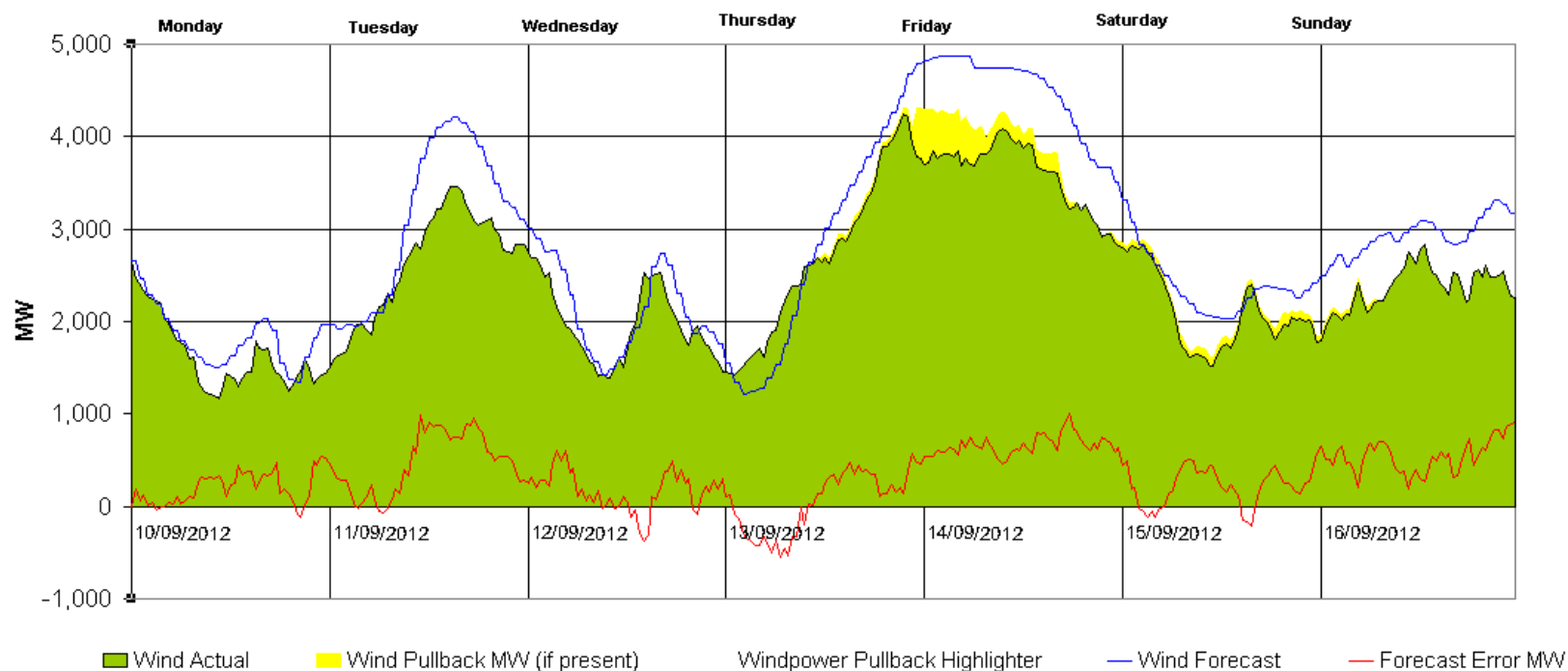
# Real-Time



# GB Metered Wind Forecast

- Forecast Error due to mixture of cut-out / weather / modelling

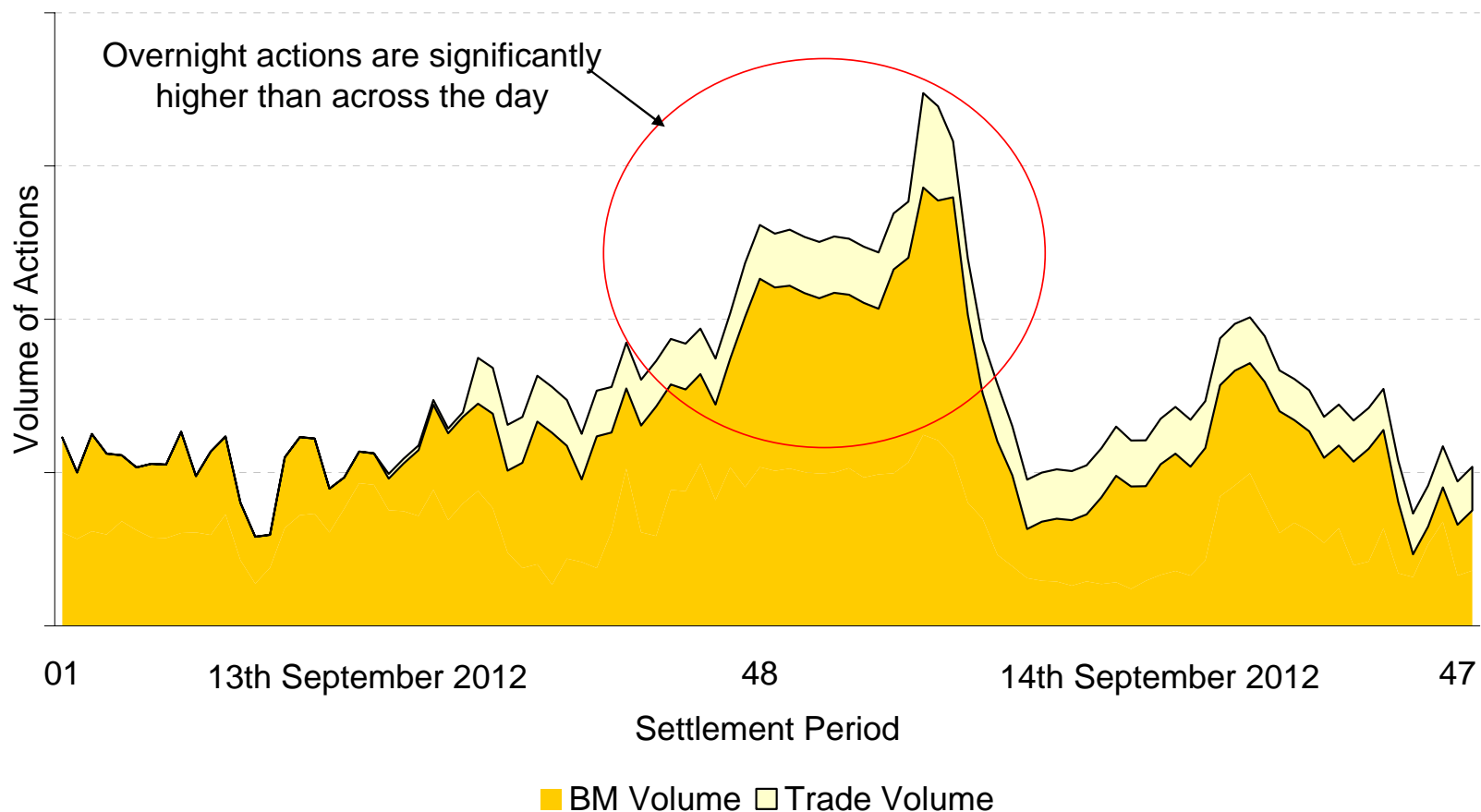
Wind Forecast Accuracy Report (4hr ahead to Real Time)  
Comparison of Windpower Output and Wind Forecast WPFS. 7 days from 10 Sep 2012 to 16 Sep 2012.



# System Operator Actions

- Nearly 3 times higher overnight than across the day

GB System Operator Actions, 13th & 14th September 2012



## Summary

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- Significant planning for managing event
  - Challenging to solve
  - Requires significant trading and redispatch
  - Constantly changing due to markets (GB & Europe) and wind forecasts



The screenshot shows a webpage from businessGreen with the tagline 'Sustainable thinking'. The navigation menu includes HOME, NEWS, IN DEPTH, REVIEWS, BLOGS, and VIDEO. The breadcrumb trail is Home > News > Energy > Wind >. The article title is 'Updated: UK breaks 4GW wind energy barrier'. The sub-headline reads 'Wind farms supplied nearly 11 per cent of UK electricity at 10am today as government unveils £11m renewable energy contest'. The author is Jessica Shankleman, dated 14 Sep 2012, with 5 comments. The article text states: 'UK wind farms generated a record amount of wind power this week, hitting the 4GW milestone for the first time and peaking at 10 am this morning. As predicted by National Grid, wind turbines last night passed the current UK record of 3.8GW, which was set three months ago.'